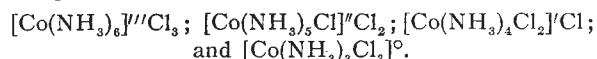


is  $\text{CoCl}_3 \cdot 5\text{NH}_3$ , but only two-thirds of its chlorine can be precipitated. In praseo-cobalt chloride,  $\text{CoCl}_3 \cdot 4\text{NH}_3$ , only one-third of the chlorine reacts as an ion, whilst the compound  $\text{CoCl}_3 \cdot 3\text{NH}_3$  is not ionised at all.

Now, according to Prof. Werner, the coordination number of cobalt in all these compounds is six, that is to say, the cobalt atom is in all cases associated with six groups or atoms. Outside this are the negative ions. The valency of the positive ion diminishes as the electronegative element in it is increased. Thus we have the following series of compounds:—



It will be seen that here again the essence of the theory lies in the idea of coordination or association as distinct from ordinary valency with its separate linkages. The same ideas may be extended to water of crystallisation in hydrated salts.

This slight sketch will, it is feared, give but a poor idea of the ingenuity and comprehensiveness of Prof. Werner's theory, but it is all that the limits of space allow. The book before us may be strongly commended to all who are interested in the development of chemical theory, and though, no doubt, the new doctrine cannot by any means be called unexceptionable, there is much in Prof. Werner's book that is interesting and stimulating quite apart from the clear exposition of the particular views it is intended to disseminate.

A. SMITHELLS.

#### THE DANISH FISHERY INVESTIGATIONS.

*Meddelelser fra Kommissionen fra Havundersøgelsen. Serie Hydrografi*, Bd. i., Nos. 7-8; *Serie Fiskeri*, Bd. i., Nos. 4-8; *Serie Plankton*, Bd. i., No. 3. (København, 1. Kommission Hos C. A. Reitzel, 1905.)

THE reports issued by the Danish section of the International Fisheries Investigation Organisation deal to a greater extent with purely biological matters than do the publications of the corresponding British committee. Thus of the present instalment of reports two relate to hydrographical researches, one to plankton studies, while five deal with the life-histories of species of fishes of economic importance.

The hydrographic reports consist of an investigation by Mr. J. P. Jacobsen on the solubility of oxygen in sea-water, with a description of the methods and apparatus employed. Mr. J. N. Nielsen also contributes an account of several hydrographic cruises made by the *Thor* in the summer of 1904 on the north coast of Iceland, and a discussion of the results obtained. The sea-water on the north coast of Iceland is derived from warm Atlantic water in the Denmark Strait—the Irminger current—and from much colder, but lighter, water of Arctic origin, which comes from the East Greenlandic polar current. The climate of the North Icelandic coast is dependent to some extent on the relative distribution of these two contributing currents. The Irminger current flows

north along the west coast of Iceland, and then, as a result of the earth's rotation, along the north coast. This latter cause, and also the interference of the East Greenlandic polar stream, produce a further rotation of the current, so that it may even round the north-east coast of Iceland and flow south. Along its whole course the Irminger current yields up heat to the atmosphere, cooling by convection as it does so, so that even the lower layers give up their heat. Land-water, produced by the melting of ice and snow masses, cools down the coastal waters, and, being of lower salinity, causes a surface current seawards during the summer and an undercurrent landwards. In winter the lower temperature of the land cools the sea-water, which then sinking in consequence of its greater density, flows seawards as an undercurrent, while it is replaced by a surface current moving towards the land.

The distribution of the comparatively warm Irminger current is affected by the presence of drift ice; in those years when drift ice is abundant on the Icelandic coasts, the cold (though less dense) Arctic water spreads over the surface, and blocks to a variable extent the eastward passage of the Atlantic water. But it also prevents the conduction of heat from the latter to the atmosphere, and as a result, during these hard ice years, the mean temperature of the air of the first six months of the year is much lower than in those years when drift ice is absent or less abundant during the months in question. In this connection the suggestion that telegraphic cable communication with Iceland, and a coast telegraph line, should be established is of considerable interest, for the advent of the ice can usually be foretold by observations of the temperature of the sea.

Not only does the temperature of North Iceland during the winter depend on the distribution of the eastern branch of the Irminger current, but the fisheries vary in an analogous manner. This appears to be the case with the great herring fishery, and cod appear also to travel to the west, north, and east of Iceland with the current, not appearing in abundance until the temperature of the water reaches a certain value. The pelagic larvæ of the latter fish are also distributed by the current, as well as by the offshore and inshore movements of the water due to the cause mentioned.

A short note by Mr. C. G. J. Petersen on the occurrence of *Leptocephali* is of exceptional interest. It is well known that finds of this stage of the common eel have been very rare in northern waters. Dr. Petersen tells us that it occurred to him to look for these larvæ in warm and deep Atlantic water, using special fishing apparatus. Accordingly in May, 1904, Dr. J. Schmidt found a typical *Leptocephalus brevis* at a station south-west of the Færøe Isles, in water more than 1000 metres in depth, and in a postscript it is also added that great quantities of *Leptocephalus brevis* have been found by Schmidt "in the depths of the Atlantic," presumably near the same place. Dr. Petersen concludes that it is here, not in the Baltic or North Seas, that the eels of Northern Europe breed, passing in their migrations either the North Sea or

the English Channel; and he discusses the value of this discovery from the point of view of the Swedish, Danish, and German eel-fisheries. We await with considerable interest the further account of these remarkable investigations.

The other reports are also of considerable interest. Mr. A. C. Johansen writes on the life-history of the young post-larval eel. Mr. A. S. Jensen contributes a paper on the occurrence of the otoliths of Gadoid fishes in the bottom deposits of the polar seas between the Færøes, Jan Mayen, and Scotland. Samples of mud obtained from the sea-bottom in these regions frequently contained otoliths derived from various *Gadus* species. Nevertheless, the trawling operations of the *Michael Sars* showed that the cod does not live at the bottom of these seas. The occurrence of *Gadus* otoliths is therefore to be explained by the horizontal migration of these fishes from the shore grounds near the surface of the sea. Some observations made by Mr. T. Scott on the occurrence of whiting otoliths in the stomach of the porpoise show also that these structures may be distributed over wide areas of sea-bottom, since whiting are eaten in large numbers by the porpoise and the otoliths may be evacuated in an undecomposed condition. This is presumably the case also with other of the smaller gadoid fishes.

The remaining papers include a study of the post-larval stages of *Gadus*, spp., and of *Brosimius brosme* by Mr. J. Schmidt, both notable additions to the literature of the subject, and a description of several new Peridinians by Mr. O. Paulsen.

JAS. JOHNSTONE.

#### THE EVOLUTION OF BIOLOGY.

*Geschichte der biologischen Theorien, seit dem Ende des siebzehnten Jahrhunderts.* Teil i. By Dr. Em. Radl. Pp. vii+320. (Leipzig: W. Engelmann, 1905.) Price 7s. net.

ALTHOUGH biology is now permeated by the evolution idea, and has continually before it the ideal of giving a genetic description of the present phase of the animate world, there is some reason to fear, as Dr. Radl indicates, a growing apathy towards the study of the evolution of the science itself. Whether it be that many workers share Nietzsche's view that the study of history paralyses the intelligence, or that they feel it their primary business to make history, not to read it, or that they regard historical inquiries as the philosopher's task, not theirs, it seems certain that too little attention—in our investigations, theories, and teaching alike—is paid to the historical evolution of the science. A notorious example may be found in the biological work of Herbert Spencer, who, though he had almost accidentally found inspiration from a slight acquaintance with the work of von Baer, deliberately set his face against looking for more. He preferred to think for himself. But all cannot be excused as we excuse Spencer, and even his work suffered from his peculiarly detached independence of outlook. Whether we will or no, the past lives in the present, and he who thinks himself most emancipated from all scien-

tific tradition may be a signal instance of the rehabilitation or recrudescence of doctrines which characterised his unknown intellectual ancestors. It is not as if scientific discoveries were successive special creations which had their day and ceased to be, giving place to others unaffiliated to them. On the contrary, as Dr. Radl's book, and any other piece of careful historical work, shows, biology is an evolution. Generalisations grow and vary, there is an amphi-mixis of ideas, there is an adaptation to the social environment, there is a struggle for existence and a survival of the fittest.

Without much discussion of the factors which brought about the scientific renaissance, Dr. Radl begins by showing how the influence of Aristotle persisted in men like Cæsalpinus, Harvey, Glisson, and Redi. The second chapter shows how the mechanical modes of interpretation, vindicated by the physicists, began to insinuate themselves into biology, through Descartes, Borelli, Fr. Hoffmann, and Dr. Willis. The advent of the microscope is then discussed, and an interesting account is given of the work and influence of Malpighi and Swammerdam. A reaction from Cartesian mechanism found expression through the genius of Leibnitz, and vitalism its first thoroughgoing exponent in Stahl.

The fifth chapter deals with the first half of the eighteenth century, with the successors of Malpighi and Swammerdam, and with the early preformationists, such as Bonnet, Haller and Buffon. Then follows an account of Linné's systematic work. Wolff is the central figure of the next chapter, which deals with the foundation of the epigenetic theory. Gradually the conception of individual development expanded into that of racial evolution, but even more in the minds of philosophic thinkers than of naturalists. The ninth chapter gives us the history of the rise and progress of morphology, illustrated especially with reference to Cuvier and Étienne Geoffroy St. Hilaire, Jussieu and P. De Candolle. After a brief chapter on Bichat as representative of vitalism at the end of the eighteenth century, the author passes to a more detailed study of the German "Naturphilosophie," as illustrated by Herder, Kant, Fichte, and Schelling among philosophers, by Kiemeyer, Goethe, Oken, Blumenbach, and Treviranus among biologists. The present volume merely begins the story of the evolution of evolution theory, the two last chapters being devoted to Erasmus Darwin and Lamarck.

Having indicated the scope of this valuable historical treatise, we must now express our high appreciation of the author's workmanship. He shows a first-hand acquaintance with the works with which he deals, and yet he has not allowed himself to be overwhelmed by his scholarship. He has a keen selective instinct and a rare terseness, and although he has written in what was to him a foreign language, his style is lucid and often vivid. One cannot but be impressed in reading the interesting history with Dr. Radl's calmness and independence of judgment; he is neither depreciative of men like Oken nor eulogistic of men like Lamarck; he states their case with justice, and gives chapter and verse for his judgments. In some cases,